

New Claims for US National Phase

1. Method for determining the alveolar opening or closing of a lung ventilated by an artificial ventilator, comprising the steps of:

measuring the hemoglobin oxygen saturation (SO_2), and

changing the airway pressure (p_{aw}) wherein from the observation of the resulting course of the measured hemoglobin oxygen saturation (SO_2) the airway pressure level at which alveolar opening or closing occurs is determined.

2. Method according to claim 1, wherein the inspiratory oxygen fraction (fiO_2) at the artificial ventilator is adjusted such that the measured hemoglobin oxygen saturation (SO_2) is approximately equal to a given reference value, and wherein the airway pressure is changed and from the resulting course of the adjusted inspiratory oxygen fraction (fiO_2) an airway pressure level is determined, which corresponds to the alveolar opening or the alveolar closing of the lung.
3. Method according to claim 2, wherein the airway pressure is increased continuously and wherein an alveolar opening of the lung is detected, if the gradient of the resulting course of the adjusted

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inspiratory oxygen fraction (fiO_2) reaches a negative minimum.

4. Method according to claim 2, wherein the airway pressure is decreased continuously and wherein an alveolar closing of the lung is detected, if the gradient of the resulting course of the adjusted inspiratory oxygen fraction (fiO_2) reaches a positive maximum.
5. Method according to claim 3, wherein the airway pressure is decreased continuously and wherein an alveolar closing of the lung is detected, if the gradient of the resulting course of the adjusted inspiratory oxygen fraction (fiO_2) reaches a positive maximum.
6. Method for determining the alveolar opening or closing of a lung ventilated by an artificial ventilator, comprising the steps of:

measuring the endtidal CO_2 concentration in the expired gas ($etCO_2$), and

changing the airway pressure (p_{aw}), wherein from the observation of the resulting course of the measured endtidal CO_2 concentration the airway pressure level at which alveolar opening or closing occurs is determined.
7. Method for determining the alveolar opening or closing of a lung ventilated by an artificial ventilator, comprising the steps of:

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measuring the CO₂ output (CO₂ volume exhaled per unit time), and

changing the airway pressure (p_{aw}), wherein from the observation of the resulting course of the measured CO₂ output the airway pressure level at which alveolar opening or closing occurs is determined.

8. Method according to claim 6, wherein the airway pressure is increased continuously and wherein an alveolar opening of the lung is detected, if the positive gradient of the resulting course of the measured endtidal CO₂ concentration and/or the CO₂ output reaches a maximal change.
9. Method according to claim 7, wherein the airway pressure is increased continuously and wherein an alveolar opening of the lung is detected, if the positive gradient of the resulting course of the measured endtidal CO₂ concentration and/or the CO₂ output reaches a maximal change.
10. Method according to claim 6, wherein the airway pressure is decreased continuously and wherein an alveolar closing of the lung is detected, if the negative gradient of the resulting course of the measured endtidal CO₂ concentration and/or the CO₂ output reaches a maximal change.
11. Method according to claim 7, wherein the airway pressure is decreased continuously and wherein an alveolar closing of the lung is detected, if the negative gradient of the resulting course of the measured endtidal CO₂ concentration and/or the CO₂ output reaches a maximal change.

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12. Method according to claim 8, wherein the airway pressure is decreased continuously and wherein an alveolar closing of the lung is detected, if the negative gradient of the resulting course of the measured endtidal CO₂ concentration and/or the CO₂ output reaches a maximal change.
13. Method according to claim 9, wherein the airway pressure is decreased continuously and wherein an alveolar closing of the lung is detected, if the negative gradient of the resulting course of the measured endtidal CO₂ concentration and/or the CO₂ output reaches a maximal change.
14. Apparatus for determining the alveolar opening or closing of a lung, comprising:
- an artificial ventilator for ventilating a lung,
- a saturation sensor for measuring the hemoglobin oxygen saturation (SO₂), and
- a data processor which determines during a change of the airway pressure (p_{aw}) from the resulting course of the measured hemoglobin oxygen saturation (SO₂) the airway pressure level at which alveolar opening or closing occurs.
15. Apparatus according to claim 14, comprising a feedback control loop which controls the inspiratory oxygen fraction (fiO₂) delivered to the patient such that the measured hemoglobin oxygen saturation (SO₂) is approximately equal to a given reference value, and wherein the data processor determines the airway

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pressure at which alveolar opening occurs from the course of the required inspiratory oxygen fraction (fiO_2) during a change of the airway pressure.

16. Apparatus for determining the alveolar opening or closing of a lung, comprising:

an artificial ventilator for ventilating a lung,

a sensor to measure endtidal CO_2 concentration ($etCO_2$), and

a data processor which determines during a change of the airway pressure (p_{aw}) from the resulting course of the measured endtidal CO_2 concentration the airway pressure level at which alveolar opening or closing occurs.

17. Apparatus for determining the alveolar opening or closing of a lung, comprising:

an artificial ventilator for ventilating a lung,

a sensor to measure CO_2 output (CO_2 volume exhaled per unit time), and

a data processor which determines during a change of the airway pressure (p_{aw}) from the resulting course of the measured CO_2 output the airway pressure level at which alveolar opening or closing occurs.

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